

SPECIFICATION AMENDMENTS

In the Specification, at page 6, paragraph [0026]:

The magnet source (10) can be any type of magnetic field source, such as, a permanent magnet or a magnet based on electric induction phenomena. The magnetic sensor (12) can be any type of sensor for measuring magnetic fields. An example of a magnetic sensor (12) is a magnetoresistive (MR) sensor. An MR sensor detects magnetic fields by resistance changes of a magnetoresistive element. The magnitudes of the signals detected by an MR sensor depend on the magnitudes and directions of magnetic flux reaching the sensor. One type of MR sensor is made of a nickel-iron thin film deposited on a silicon wafer and patterned as a Wheatstone bridge. This type of MR sensor has a field sensing range of about ± 2 gauss (G) [$1 \text{ G} = 10^{-4} \text{ tesla}$] with low hysteresis and a high degree of linearity.

In the Specification, at page 8, paragraph [0033]:

Moreover, one embodiment of the invention includes an apparatus for measuring the dimensions of a hole, as shown in Figure 8. For example, a dimension that can be measured is the radius of the hole. The apparatus includes, for example, a support member (22) having one or more arms (24). The arms (24) can be, for example, bow-spring members (26) which are fixedly set in an extended position from the support member (i.e. non-articulated) and forced against the sidewall (28) of the hole. One end (30) of each bow-spring member is attached to the support member (22), while the other end (32) is attached to the magnetic field source (34) that is movably attached to the support member (22). As shown in Figure 8, the arm (24) will change its curvature depending on the radius of the hole. The change in curvature will displace the magnetic field source (34). Such displacement will be measured by the first magnetic sensor (36) and the second magnetic sensor (38). The change of the curvature of the arm can be derived from the magnitude of the magnetic field source (34) displacement. The radius (r) of the hole is then determined from the curvature of the arm.

In the Specification, at page 9, paragraph [0036]:

Figure 10 shows a borehole (41[[0]]) penetrating an earth formation (42). A downhole tool (44) is lowered into the borehole (41[[0]]). The downhole tool (44) may be a wireline tool or a logging or measuring-while-drilling tool. The downhole tool (44) includes a displacement measurement system of the invention. In accordance with one embodiment of the invention, a first magnetic sensor (50), a second magnetic sensor (52), and a third magnetic sensor (48) are located inside the downhole tool housing (46) and the magnetic field source (54) is placed outside the housing (46). The magnetic field source (54) is moveably attached to the housing (46) through couplings (56). Also, the magnetic field source (54) may be placed within an enclosure (58) to avoid direct contact with the downhole fluids. The magnetic field source (54) is attached to one end (62) of the arm (60), while the other end (64) of the arm (60) is attached to the housing (46). As stated above, the radius (r) of the borehole is determined through the geometric relations that exist between the radius of borehole, the curvature of the arm (60), and the magnetic field source (54) displacement. In another embodiment of the invention, the magnetic field source (54) is located inside the housing (44) and the magnetic sensors (48, 50, 52) are placed outside the housing.